

# Space News Roundup

Vol. 21 No. 18

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National Aeronautics and Space Administration

## Columbia now in the VAB, pad move set for Sept. 21

KENNEDY SPACE CENTER, FL — Under preparation for its first operational mission into space, the Shuttle Orbiter *Columbia* was moved into the Vehicle Assembly Building here Sept. 9 where the process of erecting the STS-5 stack is now underway.

*Columbia* is scheduled to blast off on its fifth mission Nov. 11 with two commercial communications satellites inside its payload bay, and with plans for crew members to conduct the first Shuttle era extravehicular activity (EVA).

The crew for the five-day mission will be Commander Vance Brand, Pilot Robert Overmyer and Mission Specialist Joe Allen and William Lenoir.

*Columbia* spent about eight weeks in the hangar-like Orbiter Processing Facility prior to her move to the VAB. The most significant changes made during that time were geared to transforming her from a developmental vehicle into an operational spacecraft.

*Columbia* spent a total of 57 calendar days — 41 work days — in the OPF compared to 43 calendar days — 40 work days — in the OPF prior to STS-4. The longer turnaround was due to changes needed to outfit the spacecraft for operational use.

The number of post-flight modifications to the Orbiter dropped from 59 during the

STS-3/STS-4 turnaround to 47 in preparation for its fifth flight. These latest changes, however, were of a much higher magnitude than those preceding the fourth mission. Major changes included those needed to accommodate a four-man crew for STS-5.

Preparation for STS-3, when 94 changes were made to the vehicle, required *Columbia* to remain in the OPF for a total of 69 calendar days, or 53 work days.

Among the items removed in the latest turnaround which will not fly on STS-5 were the Remote Manipulator Arm and the Induced Environmental Contamination Monitor. The result is a weight savings of more than 1,700 pounds.

Other hardware replaced in the OPF included one upward firing thruster in the forward Reaction Control System module, all six of the small vernier thrusters, the No. 3 Inertial Measurement Unit and the No. 2 Tactical Air Navigation (TACAN) unit.

Technicians also removed the waste management system for inspection and repairs. It is scheduled to be reinstalled on the *Columbia* after the vehicle is on the launch pad.

A new item installed in *Columbia* specifically for STS-5 was the Task Simulation Device. Installed in the forward right-hand side of

the Orbiter's cargo bay, the small portable work station holds the tools that Mission Specialists Lenoir and Allen will try out when they conduct an EVA during the mission.

Parallel with all of the other work being done on the spaceship, a team of technicians was removing, repairing and bonding tiles on the *Columbia*. Workers removed less than 300 tiles while *Columbia* was in the OPF, compared to the more than 1,000 tiles taken off after the third mission. Some 200 tiles were pulled off because they were either damaged in the hailstorm that pelted the Orbiter the night before the STS-4 launch, or were damaged in flight or during the turnaround process. Another 21 tiles were removed for engineering evaluation. Repairs made to the hail-damaged tiles, most of which sustained minor damage or "dimpling," totaled about 10,000. There were no cavities on the Orbiter when it was moved to the VAB.

Now in the VAB, *Columbia* has been hoisted into the vertical position and is undergoing the mating with the external tank and twin solid rocket boosters. The assembled vehicle will undergo about six days of integrated tests, which will include a mission run to

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Shown here in their flight suits for the upcoming STS-5 mission are, left to right, Mission Specialist Joe Allen, Commander Vance Brand, Pilot Robert Overmyer and Mission Specialist William Lenoir. Preparations are on schedule for a Nov. 11 launch.

## One September day

*Three ventures run gamut of experience in the space trade*

At 10:17 a.m. Central Daylight Time on Sept. 9, from a flat barrier island off the Texas Gulf coast, space history was made when a privately financed rocket made its initial trip into space.

It barely skimmed the edge of space, in fact, and while it did not stay up for very long and did not carry a payload, Conestoga I worked as its creators had intended for it to work, and that in itself was something of a giant leap for Space Services Inc. of Houston.

A few hours later on this same September day, at about 5 p.m. Eastern Daylight Time on a barrier island several hundred miles east,

the world's most sophisticated spacecraft was rolled from a hangar and into a cavernous assembly building. It was a major milestone leading up to the first operational mission of the U.S. Space Shuttle, and for the first time, workers at the Kennedy Space Center were preparing two such vehicles for flight.

Yet a few hours later on this same September day, this time many hundreds of miles south across the Caribbean Sea, a sophisticated rocket representing the first operational mission for yet another consortium of space adventurers blasted off from its launch site in French Guiana. Both

the first and second stages of the 210-ton rocket performed well. But about 14 minutes into the flight, a turbo pump in the third stage apparently failed, and the Ariane rocket crashed into the Atlantic Ocean. It was a disap-

### Perspective

pointing setback for Europe's first commercial rocket, but the Ariane program still has commitments worth several hundred million dollars to orbit 24 satellites over the next three years, and the Europeans will be back.

The short flight of Ariane was the conclusion of a wholly remarkable day in the space age. Just a few weeks short of the 25th anniversary of the opening of the era, crews working on three widely disparate space projects encountered three of the basic experiences of the space business on the same day: jubilation as a vehicle soars flawlessly into the sky; anticipation as another important milestone is reached; and disappointment at a failure, mixed with the resolve to go back and try again.

For the people involved with Space Services, this September day was sweet indeed, but even in

triumph their celebration was tempered by sadness: Toddie Lee Wynne, 84, one of the original SSI investors, the man who owned the ranch on Matagorda Island where SSI had its launch site, died of a heart attack just a few hours before Conestoga I blasted off. One of the launch team members wrote a message on a tail fin of the rocket just prior to launch: "God Bless you Toddie Lee Wynne."

And at 10:17 a.m., following a 17-minute delay due to a minor telemetry problem, and a 24-hour delay before that due to a gyro problem, Conestoga I ignited and whooshed out over the Gulf of

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## CFC campaign begins this month

Sometimes it's not easy being human. Medical libraries are filled with diseases of the body and mind. And as if that weren't enough, we humans tend to create many of our own problems. It's all part of being human, and all part of why there's a United Way.

The United Way is an organization devoted to making it easier to deal with the problems of being human, an organization dedicated to making humanity more humane. And since each of us is responsible for keeping the United Way successful, it's like a gift we give to each other for being human.

The JSC-1982-83 Combined Federal Campaign (CFC), an annual fund raising drive for federal agencies, will begin with a kickoff meeting in a few days. The campaign supports the United Way, the National Health Agencies, the National Service Agencies and International Service Agencies. The CFC eliminated the old system of several drives each year and provided the use of government approved payroll deduction plans which spread the donations over the year in small installments.

JSC people have traditionally given wholeheartedly to the CFC drive. Contributions to this year's campaign will not only help the community, but could possibly help a neighbor, a friend, or a loved one — when they need it most. Thanks to you, it works for all of us.

## U.S. suggests global study at Unispace '82 in Vienna

Delegates from more than 90 nations were on hand last month in Vienna for the second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (Unispace '82), at which the chief U.S. representative, NASA Administrator James M. Beggs, called for new comprehensive studies of the Earth's biosphere.

Saying the Earth is "on the verge of becoming a space-faring civilization," Beggs suggested that the issue of global habitability is one of the most important which could be addressed in the future with new space technologies.

"We would like to determine whether a more effective, cooperative long-term effort is feasible on a global basis," he said. "My government believes such a cooperative undertaking

could benefit all countries of the world, developed and developing."

The habitability study the U.S. proposed would be a long term investigation of the planet's biosphere. "This is not a new idea," Beggs said at a news conference. "This has been kicking around for a long time, the idea of a world-wide study in which a number of different countries could both contribute and participate in a better understanding of what's happening to the globe — what we are doing to it with man-made changes, with things like the carbon dioxide problem and ozone depletion."

Beggs said there are still understandings to be gained of the way Earth's atmosphere changes when volcanoes erupt and how the solar constant affects Earth's

climatology.

"We hope to attract a lot of international cooperation and move out with a program which will be coordinated around the world. We would be happy to have the Soviets join us in this," Beggs said.

Beggs also proposed that the United Nations Outer Space Division sponsor a working group on disaster assistance communications to examine the possibilities for a global emergency space communications system for use in natural disasters. As envisioned by the U.S., the system would make use of global disaster monitoring and early warning capabilities provided by satellites. The U.S. Agency for International Development will sponsor a conference in the spring

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## Space News Briefs

### International Comet Halley watch formed

An international network of scientists and amateur astronomers is being organized to observe perhaps our most famous celestial visitor — Comet Halley — when it passes Earth in 1986. The International Halley Watch, led by Ray Newburn, a cometary science team leader at the Jet Propulsion Laboratory, and Jurgen Rahe, director of the Remeis Observatory in the Federal Republic of Germany, was announced in late August at a meeting of the International Astronomical Union in Patras, Greece. Information gained by ground-based observations, along with those of airborne and Earth-orbital instruments, will form the Halley Archive, the largest collection of information ever produced on a single comet. Japan, the Soviet Union and the European Space Agency are each sending spacecraft to encounter the comet and plan to supply their scientific results to the archive. Halley Watch discipline studies will be conducted in large-scale phenomena, near-nucleus studies, spectroscopy and spectrophotometry, photometry and polarimetry, infrared spectroscopy and radiometry, radio science and astronomy. Contributions of amateur astronomers are welcome, Halley Watch officials say, and should be directed to the office at JPL.

### 'Antiquated' engine used as solar device

When the Rev. Robert Stirling, a Scottish minister, developed a simple closed-cycle engine way back in 1816, there is little doubt he would have been totally unable to imagine it being used 166 years later as a solar conversion system with near unheard of 29-percent efficiency. But that is what has happened at the Jet Propulsion Laboratory, where concentrated sunlight was used in desert tests to drive a Stirling engine with unusually high efficiency. Solar radiation striking a series of mirrors is used to create heat which in turn powers the engine. During tests, which have been going on since 1979 at a JPL test site at Edwards Air Force Base, the system has successfully fed a daily average of 250 kilowatt hours of electrical energy into the Southern California Edison utility grid. Peak power output was 23.5 kilowatts.

## Bulletin Board

### Burke Baker highlights ancient astronomies

Centuries before the telescope, ancient peoples chronicled the heavens using complex megalithic observatories like Stonehenge and Avebury. Through Nov. 21, the Burke Baker Planetarium will highlight these ancient astronomical methods in its planetarium shows. Part of the Houston Museum of Natural Science, the planetarium is located at 1 Hermann Circle Drive in Hermann Park. Show times for "Ancient Astronomies" are Wednesday and Friday at 4 p.m., Saturday and Sunday at 2, 3 and 4 p.m., and Friday evenings at 8 p.m. The admission price is \$2 for adults and \$1 for children under 12. There is no admittance after the show begins.

### Astronomical Society plans expedition

The JSC Astronomical Society is launching its fourth worldwide solar eclipse expedition with a 16-day tour of the Orient in conjunction with the best total eclipse of the sun this decade. Participants will observe and photograph the mid-day blackout of the sun from two sites on the island of Java in the Indonesian chain. The solar spectacular, which occurs in June of next year, will last for five minutes and ten seconds. The tour departs Houston June 3, 1983 and returns June 18. Cost is about \$3,200 per person. Space is limited to 32 persons, and as of the end of August six slots were left. For more information, call Paul D. Maley, x3319 or Alan Dabney at 237-8294.

### Flu immunizations scheduled by clinic

Again this year, the JSC Clinic is giving influenza vaccine inoculations which will be available on a drop-in basis beginning Sept. 27, Monday through Friday from 10 a.m. to noon and 2 to 4 p.m. Annual vaccination against the virus is recommended for "high risk" individuals and should be considered for those persons who provide essential services, clinic management said. "Last year we had very few reactions, all minor. However, there is a risk of more adverse reactions, so those taking the vaccine will be asked to sign a consent form. You will be provided the opportunity to ask questions and receive the vaccine if you wish," a Clinic spokesman said.

### Bicycle Club Century Ride set for 19th

Getting in shape? The JSC Bike Club has a goal for you: ride in the JSC Bike Club Century Ride on Sunday, Sept. 19. Patches will be awarded for completing 25 miles in three hours, 50 miles in six hours or 100 miles in twelve hours. Riders will be traveling across the wide open spaces of the Texas coastal plain near Dickinson, Angleton and Chocolate Bayou. Refreshment stops, checkpoints, and sag service will be provided. The ride begins at 7 a.m., and registration runs from 6:30 to 8:30 a.m. at the Kroger parking lot on Interstate 45 and FM 517 in Dickinson. The registration fee is \$4. For more information, call Sheldon Tucker at x4107 or Judy Allton at x2666.

### Rec Center group offerings listed

The Gilruth Recreation Center is available for group luncheons, dinners, receptions and picnics, according to Manager Ted MacDonald. A minimum of 35 persons is required for use of the facility by NASA and NASA contractor groups, as well as a few days notice, he said. Meal specials through September include Chinese pepper steak from Sept. 13 to 17, German sausage from Sept. 20 to 24 and baked ham from Sept. 27 to Oct. 1. All meals include salad, vegetables, dessert and beverage at a price of \$2.99 per person. For more information on the specials, call the Rec Center at x4921.

### JSC Aero Club continues membership drive

The JSC Aero Club is still accepting new membership applications for flying at club rates. Members may rent a Cessna 150 for \$20 an hour wet or a four-place Piper Archer II, with auto pilot, air conditioning and full IFR panel for \$30 an hour wet. Member dues are \$25 per month. The planes are based at Houston Gulf Airport in League City. Two club members are certified flight instructors available for beginning lessons or advanced flight instruction. Membership is open to JSC employees and contractors. Experienced pilots are desired, but non-pilots may join and learn to fly. For more information or membership application forms, call J. D. Haptonstall at x5285, Dennis Morrison at x5281 or B. Mercantel at x2314.

## "Raise the mizzen and configure AOS, ye lubber"



It may look like Orbiters are going amphibious, but this is actually the first place winner in a decorated boat contest in Bournemouth — Christchurch England. The 20-footer, decorated by Peter Pester of Bournemouth, is shown here "taxiing" to the dock where it was awarded the prize. Pester's son attends the University of Manchester with Richard Metcalf, son of William R. Metcalf, chief of the Mechanical Branch, Facilities Design Division, who shared this photo with us.

## Beckman, Pacek and Schmitt named Employees of the Year

The Federal Business Association (FBA) has named JSC employees Charles Beckman, Janet Pacek, and Joe Schmitt as "Federal Employees of the Year."

The FBA annually makes the selections from agency nominations in eight categories. Beckman will receive his award in the administrative category while Pacek was chosen in the clerical category. Schmitt is to be honored for length of service.

The three were chosen out of a total area federal population of 18,000, based on ability, technical competence and active community participation. They are to be honored at the awards luncheon on Sept. 16.

Beckman serves as program analyst for the Ground Data Systems Division, Data Systems

and Analysis Directorate. In addition to his JSC duties he is involved in numerous community activities. Beckman serves as Commissioner on the Pasadena Civil Service Commission, is past President and Director of the Pasadena American Heart Association, is Vice Chairman of Deacons at the Pasadena First Baptist Church, and a Director of the Baywood Country Club.

Janet Pacek is secretary to the Deputy Director of the Flight Operations Directorate and in that capacity interfaces daily with all levels of management at the Center and NASA Headquarters. She is also a college student and averages 6 to 9 credit hours per semester. She also has served as President of the Woodcreek Civic Association and is active in the PTA. She is active in church, serv-

ing as secretary, teacher, and in many volunteer activities.

Joe Schmitt, winner of the career service award, is an equipment specialist in the Crew Systems Division, Engineering and Development Directorate, and has completed 44 years of dedicated public service. Schmitt served in the U.S. Army from 1936 through 1939, worked as a civilian with the U.S. Navy from 1941 to mid-1946, and spent the rest of his public service career with NACA and NASA.

If you would like to attend the FEB/FBA awards ceremony honoring these co-workers and others, tickets for the luncheon, to be held September 16, at the Holiday Inn Medical Center, 6701 South Main, are available at the Bldg. 11 Exchange Store for \$6.75.

## People

NASA's highest award, the Distinguished Service Medal, will be presented to JSC Deputy Director Clifford E. Charlesworth in early October in ceremonies at NASA Headquarters. Charlesworth, who began his career at JSC in 1962, is being honored "in recognition of his distinguished leadership in the management of programs and institutional activities at the Johnson Space Center. His achievements have been vital to the success of this nation's manned spaceflight programs." Charlesworth came into center management from the Flight Operations Directorate, for which he was a flight director for Apollo 11 and other early lunar missions. In 1976 he was designated acting manager of the Space Shuttle Payload Integration and Development Program Office. In 1979 he was named acting Deputy Director of JSC, and in February of 1980 he was named Deputy Director.

At NASA Headquarters, the Office of Space Transportation Systems and the Office of Space Transportation Operations have been combined into the Office of Space Flight. Lt. Gen. James A. Abrahamson heads the Office as Associate Administrator for Space Flight. L. Michael Weeks is Acting Deputy Associate Administrator and there will be three Assistant Associate Administrators, among them Col. Joe H. Engle, STS-2 Commander, who will fill the role in support of Space Transportation. David R. Braunstein is Acting Assistant Associate Administrator for Institutions. The Assistant Associate Administrator slot for policy is as yet vacant. Ivan Bekey is serving as Acting Director, Advanced Planning Division. The Spacelab Division is headed by James C. Harrington. The Customer Services Division is headed by Chester M. Lee. The new organization for Code M was effective in early August.

## JSC earns EEO award

NASA's Equal Opportunity Council has selected the Lyndon B. Johnson Space Center as the recipient of the agency's fiscal year 1981 Equal Opportunity Trophy.

The award is presented annually to the NASA center which has "implemented the most effective management approaches and has achieved the most positive affirmative action results" in the employment of minorities, women and handicapped persons.

A formal presentation was held last week at the Center. Individuals who made significant contributions to the Center's equal opportunity efforts were recognized at the ceremony.

The fiscal year 1981 award covers the period from Oct. 1, 1980 to Sept. 30, 1981.

The traveling trophy last year went to the Goddard Space Flight Center in Greenbelt, MD, the first time it was presented.

## September day

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Mexico in a 10-minute, 320-mile flight.

Mission Director Donald K. "Deke" Slayton, who retired from JSC last spring, said afterward, "Obviously, we were very pleased with the results. As far as we know, all systems worked exactly as they were designed to. The next thing we're going to do is go and drink a lot of beer. After that, we're going to put together an orbital launch vehicle. We'll be back

with it in two years."

If that goal is accomplished, and if Space Services does begin lobbing satellites into low Earth orbit from Hawaii as is the plan, they will have become the first private firm to go into the space launching business. The idea seems vastly more reasonable now than it might have 25 years ago, especially after the events of one September day last week.

— Brian Welch

NASA  
Lyndon B. Johnson Space Center

## Space News Roundup



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Editor

Brian Welch

# An OFT breakdown

*A summation of the Space Shuttle's Orbital Flight Test program*

Flight	Crew	Duration	Launch/Landing	Payloads	Comments	Cumulative space man/hours, U.S. <i>(22 503 hrs 49 min 50 sec thru ASTP)</i>
<b>STS-1</b>	John Young Robert Crippen	2 days, 6 hrs., 20 min., 53.1 sec. 54 hrs., 20 min., 53.1 sec. MET 36 Earth orbits 933,757 miles	April 12, 1981, 6 a.m. CST April 14, 1981, 12:20 p.m. CST Edwards AFB, Calif.	Flight instrumentation	First NASA manned flight with non space-tested vehicle	108 hrs., 41 min., 46 sec. <i>(22 612 hrs 31 min 36 sec)</i>
<b>STS-2</b>	Joe Engle Richard Truly	2 days, 6 hrs., 13 min., 12 sec. 54 hrs., 13 min., 12 sec. MET 36 Earth orbits 933,757 miles	Nov. 12, 1981, 9:10 a.m. CST Nov. 14, 1981, 3:23 p.m. CST Edwards AFB, Calif.	OSTA-1 DFI ACIP NOSL	First operation of RMS. mission cut to two days due to fuel cell failure	108 hrs., 26 min., 24 sec. <i>(22 720 hrs 58 min)</i>
<b>STS-3</b>	Jack Lousma Gordon Fullerton	8 days, 4 min., 49 sec. 192 hrs., 4 min., 49 sec. MET 129 Earth orbits 3.9 million miles	March 22, 1982, 10 a.m. CST March 30, 1982, 10:04 a.m. CST Northrup Strip, White Sands Missile Range, New Mexico	OSS-1 DFI ACIP GAS eval. EEVT MLR PDP IECM	Bad weather at Northrup caused one-day landing delay	384 hrs., 5 min., 38 sec. <i>(23 105 hrs 3 min 38 sec)</i>
<b>STS-4</b>	T. K. Mattingly Henry Hartsfield	7 days, 1 hr., 11 min., 11 sec. 169 hrs., 11 min., 11 sec. MET 112 Earth orbits 2.9 million miles	June 27, 1982, 9:59:59 a.m. CDT July 4, 1982, 11:09:31 a.m. CDT Edwards AFB, Calif.	DoD 82-1 MLR CFES GAS IECM NOSL ACIP	First landing on concrete runway, Edwards No 22	338 hrs., 19 min., 2 sec. <i>(23 443 hrs 22 min 40 sec CMH after STS-4)</i>

## JSC well represented at Unispace '82



Administrator Beggs at Unispace '82

Photo by Carolyn Conley

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of 1984 in Washington, D.C. to examine the idea in more detail, Beggs said.

The NASA Administrator also noted that the U.S. has entered into over 1,000 agreements with over 100 countries "to share the benefits and adventure of outer space." He said the U.S. will shortly begin field testing a combined low-cost satellite ground station and photovoltaic power system for developing countries as part of this overall effort to share space technology.

On Tuesday, Aug. 10, JSC was well represented at Unispace during an evening's entertainment sponsored by the U.S. delegation in the Volkstheater in Vienna. Master of ceremonies for the event was author James Michener, who spoke on "The Impact of Space on Mankind." Astronaut Henry Hartsfield, pilot for STS-4, narrated a film clip of that mission, and Astronauts Drs. Anna and William Fisher delivered a joint presentation on "The Challenge of the Future to Work in Space." Security Branch Chief Everett

Shafer provided astronaut security, and Public Services Branch Chief Charles A. Biggs handled the NASA exhibit, which was viewed by about 190,000 people. Jack Heberlig and Jim Merrell represented IBM at the exhibit.

The U.S. exhibit was a cooperative venture between NASA and several private companies and universities. The companies participating were Ford Aerospace, General Dynamics, Grumman Aerospace, IBM Federal Systems Division, International Imaging Systems, Lockheed, Martin Marietta, McDonnell Douglas, RCA Government Systems Division, Rockwell International, Townsend Associates and the American Institute for Aeronautics and Astronautics.

The first Unispace Conference was held in Vienna in 1968. Preparatory work for this second meeting of nations began in 1979. The three broad goals of the conference were to assess the present and future state of space science and technology, consider the applications of space tech-

nology to economic and social development and to evaluate potential international cooperation in space, especially that which could benefit developing nations.

The Committee on the Peaceful Uses of Outer Space, a 53-nation body chartered in 1959 as the focal point of UN space-related activities, prepared the report which laid the groundwork for Unispace '82. About 150 countries now use space communications.

Secretary General for Unispace, Prof. Yash Pal of the Space Applications Centre in Ahmedabad, India, said, "It is not my intention to suggest that every country embark on a space program. I am only suggesting that among the tools available for combating poverty, for spreading education and strengthening indigenous cultures, space technology could be an important one. A thousand years from now, if the human race still survives on this planet, the last quarter of this century would perhaps be considered as a new beginning for humanity."

— Reported by Carolyn Conley in Vienna.

## Test successful on 099 main engine at NSTL

The first of three Space Shuttle main Engines for Orbiter vehicle 099, the *Challenger*, was successfully ignited last week in the first of a series of acceptance tests.

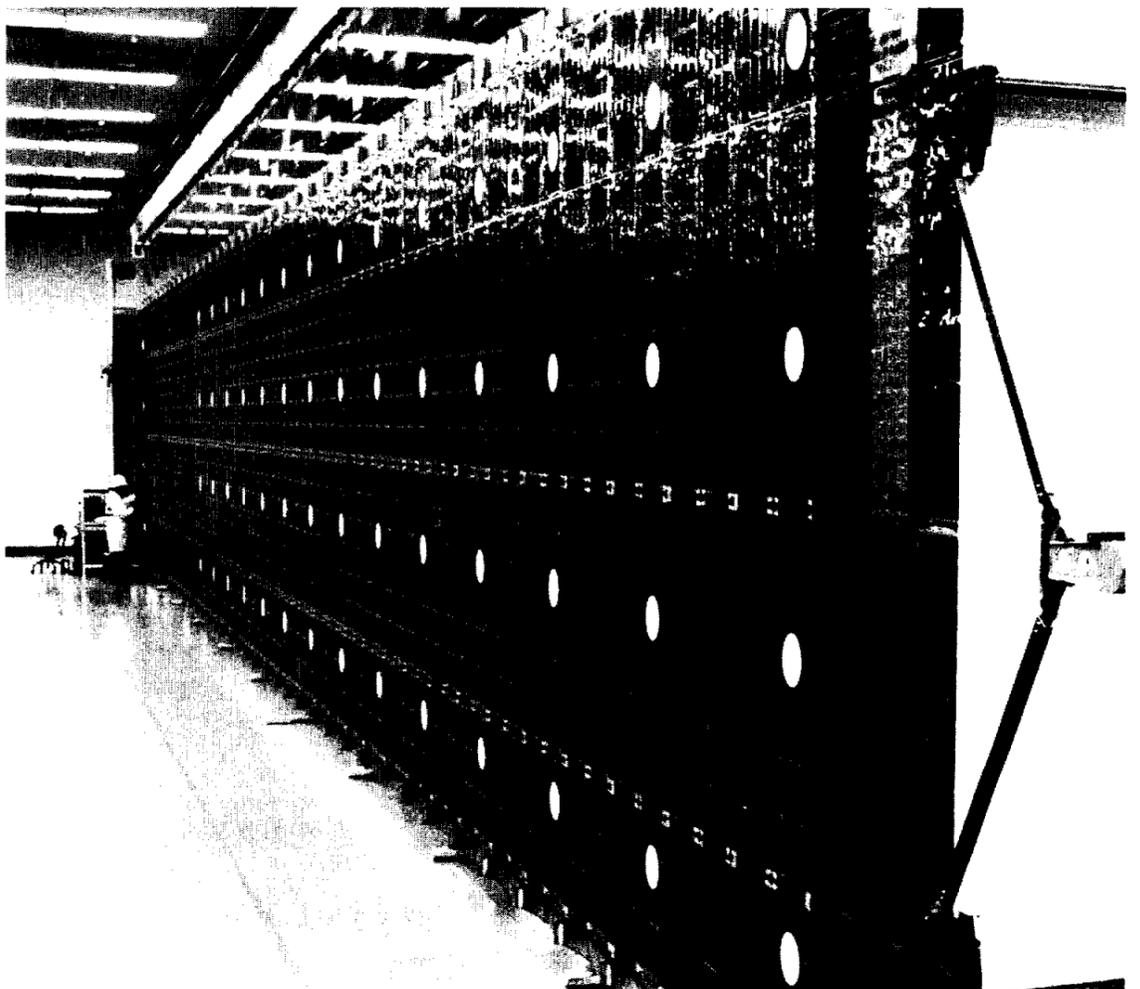
The 1.5-second ignition test on engine number 2012 was designed to verify the start sequence. Each of the engines will undergo such a test, as well as a 100-second calibration and a 500-second endurance test approximating the performance necessary to help loft Orbiters into low Earth orbit.

During the calibration and endurance test firings at the National Space Technology Laboratories in Mississippi, the engines will be throttled up to a power level nine percent higher than the thrust capability of the engines now in use on *Columbia*. This additional thrust capability, which will allow

*Challenger* to carry heavier payloads into space, is the result of development work done since *Columbia*'s engines were accepted in 1979.

Each engine must complete a series of test firings, and mechanical and electrical checkouts before being certified for flight by the Marshall Space Flight Center. After acceptance, they will be shipped to the Kennedy Space Center for installation aboard *Challenger*, now scheduled for her maiden voyage in January 1983. Engine number 2012 is expected to be shipped later this month. The remaining two engines, numbers 2015 and 2011, are scheduled for shipment in October.

The Space Shuttle main engines are manufactured and tested by the Rocketdyne Division of Rockwell International under contract to Marshall.



An experimental solar array wing as tall as a 10-story building is shown here fully extended during tests at a Lockheed facility in California. Under development for the Marshall Space Flight Center, the wing will fly aboard the Shuttle in 1984 as part of the Solar Array Flight Experiment, an effort to further develop large solar array technology. During launch, the accordion-like array would be folded into a package less than four inches thick.

## Columbia

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simulate the Abort Once Around capability of the Orbiter's new Version 19 software for STS-5. Rollout of the completed vehicle is scheduled for Sept. 21.

Major tests at Complex 39's Pad A will include checks between the vehicle and pad systems, a

launch-day rehearsal with the STS-5 crew on Sept. 24, and a propellant loading test of the external tank on Sept. 28.

Countdown preparations should begin the first of November, leading up to the start of the five-day Shuttle launch countdown and liftoff Nov. 11. — Mark Hess

## Gilruth Center News

Call x3594 for more information

**Winter softball** — Openings still exist in men's, women's and mixed softball leagues for fall and winter play. The fall league runs from October to December and the winter league from January to March at a cost approximately 80% off the regular season fee. For more information, call the Rec Center at x3594.

**Race** — The next Rec Center race is a five kilometer and one mile beginning at 8 a.m. Sept. 25, with an entry fee of \$1.

**Scuba** — An NAUI-certified basic scuba course begins Sept. 28 with classes from 6:30 to 9 p.m. Tuesdays and pool sessions Wednesdays starting at 7:30 p.m. The course cost is \$70, and no equipment is necessary prior to the first meeting.

**Beginning oil painting** — Learn the relaxing art of oil painting. The class is designed for the beginner and meets Tuesdays from 7 to 9 p.m. The class begins Sept. 15 and costs \$30.

## Cookin' in the Cafeteria

### Week of September 13-17, 1982

**Monday:** Cream of Potato Soup; Franks & Sauerkraut, Stuffed Pork Chop, Potato Baked Chicken, Meat Sauce & Spaghetti (Special); French Green Beans, Buttered Squash, Buttered Beans.

**Tuesday:** Navy Bean Soup; Liver & Onions, Beef Stew, Shrimp Creole, Smothered Steak w/Dressing (Special); Corn, Rice, Peas, Cabbage.

**Wednesday:** Seafood Gumbo; Roast Beef, Baked Perch, Chicken Pan Pie, Salmon Croquette (Special); Mustard Greens, Italian Green Beans, Sliced Beets.

**Thursday:** Beef & Barley Soup;

Beef Tacos, Diced Ham w/Lima Beans, Stuffed Cabbage (Special); Ranch Style Beans, Brussels Sprouts, Cream Style Corn.

**Friday:** Seafood Gumbo; Fried Shrimp, Deviled Crabs, Ham Steak, Salisbury Steak (Special); Buttered Carrots, Green Beans, June Peas.

### Week of September 20-24, 1982

**Monday:** Cream of Chicken Soup; Beef Burgundy over Noodles, Fried Chicken, BBQ Sausage Link, Hamburger Steak (Special); Buttered Corn, Carrots, Green Beans. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin.

**Tuesday:** Beef Noodle Soup; Baked Meatloaf, Liver & Onions, BBQ Spare Ribs, Turkey & Dressing (Special); Spanish Rice, Broccoli, Buttered Squash.

**Wednesday:** Seafood Gumbo; Broiled Fish, Tamales w/Chili, Spanish Macaroni (Special); Ranch Beans, Beets, Parsley Potatoes.

**Thursday:** Navy Bean Soup; Beef Pot Roast, Shrimp Chop Suey, Pork Chops, Chicken Fried Steak (Special); Carrots, Cabbage, Green Beans.

**Friday:** Seafood Gumbo; Broiled Halibut, Fried Shrimp, Baked Ham, Tuna & Noodle Casserole (Special); Corn, Turnip Greens, Stewed Tomatoes.

## Roundup Swap Shop

Ads must be under 20 words total per person, double spaced, and typed or printed. Deadline for submitting or cancelling ads is 5 p.m. the first Wednesday after publication. Send ads to AP3 Roundup, or deliver them to the Newsroom, Building 2 annex. No phone-in ads will be taken. Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads.

### Property & Rentals

For lease: 12 to 14 months from Nov. 1, Heritage Park 3-2-2, furnished/unfurnished neg., \$650/mo. Call Graham, x2666.

For lease: CLC Eldorado Way condo., large upstairs 1 BR, W/D, burglar alarm, covered parking, all recreational facilities, avail. Oct. 1, \$415/mo. plus dep. Call Jim Briley, x2831 or 488-7901 after 5 p.m.

For lease: 1 BR, study, condo., W/D, DW, refrig., pool and rec-room, 1 CP, avail. Sept. 15. Call Barbara, 486-6285 or 486-5748 after 5 p.m.

For sale: Texas campground, Conroe, 2 lots 80 x 100, private, swim, security, bike trail, group facilities, showers, total price \$1,200. Call Dick, x6411 or 946-4075.

For sale: Waterwood, Lake Livingston lot, near Coldspring, sized for weekend home, near golf, tennis, stables, etc. Call Bill, 488-1410.

For sale: 3-2-2A in Seabrook (Miramar), new roof, tile, inside and outside paint, VA assumption. Call Bill, 488-1410.

For rent: Galveston By-The-Sea condo., two BR, furnished apartment for rent by days (2 min.) week or month. Call Clements, 474-2622.

For sale: Lease home in League City, Glen Cove, 3-2-2A, VA assumption, leased till 6/83. Call Bill, 488-1410.

For rent: Galveston Jamaica Beach, 3 BR, central AC, boat mooring, \$130/wkend., \$260/wk., fish West Bay and San Luis Pass. Call 337-3970.

For rent: League City 3-1 1/2-2, newly redecorated, nice neighborhood, no pets, \$525/mo. plus deposit. Call 554-6200.

For rent: 1 BR lakefront condo., W/D, ref., fireplace, cable, beautiful view of Clear Lake, \$567/mo. Call 476-9116 evenings.

For lease: University Green new patio home, 2 master suites, detached garage, fireplace, fenced many extras, no pets, \$750/mo. plus deposit. Call 480-6516 or 488-0500 after 5 p.m.

For lease: Pipers Meadow 3-2-2, dining, fireplace, must see to appreciate, no pets, \$650/mo. plus \$650 deposit. Call 480-6516 or 488-0500 after 5 p.m.

For sale or rent: League City, Pecan Forest 3-2-2, fireplace, like new \$725/mo. or finance below market in 70's. Call 554-6200.

For sale or rent: League City 3-1 1/2-2, fenced, like new, \$525/mo. or in 50's. Call 554-6200.

For sale: 1.39 acre lot in Friendswood, Cowards Creek, by owner, assume 10%, \$41.5K total. Call Chambliss, x4451 or 486-1907.

For lease: Forest Bend 2 BR townhome, 1 1/2 baths, W/D conn., ceiling fans, patio, no pets, \$500/mo. Call Cornett, x6444 or 1-420-2936.

### Household

Dinette set, wood veneer table, 4 chairs, green frame, green/yellow flowered pattern, \$75. Call Gary, x2156 or 482-1290.

Single mattress, box spring and frame, excellent condition, all for \$50. Call 333-2335 after 5 p.m.

1930's mirrored deco vanity, \$200. Call 480-1447 after 5 p.m.

Hide-a-bed sofa with queen size mattress, Herculon material, \$150. Call 482-4691.

Gas cook top, Sears 36", drop-in type with griddle and "Majic-Eye," harvest gold, \$50. Call 482-5536 after 5 p.m.

Sears dishwasher, under counter, \$20. Call Marchal, 534-3021 after 5 p.m.

Living room furniture: couch, 2 cane back chairs, lamp, all wood coffee table and commode table. All excellent condition, \$500 or will divide. Call Bob Stuckey, x3166 or 481-2754 evenings. Jenny Lind baby crib, baby car seat,

crib sheets, portable sewing machine, antique radio, Danish coffee table, ceramic cook top. Call Young, x4164.

Two complete twin beds, \$60 each; large 2 piece gun cabinet, \$225; sofa, chair and ottoman, \$100 for all. Call Capt. Brooke, x2451 or 996-0027.

Solid wood coffee table, 30" x 30", \$25. Call 333-2359.

Large sofa, good condition, \$100; genuine wood stereo cabinet, beautiful wood, \$50. Call 488-6433.

Free for the taking: GE dishwasher, working when removed, and galvanized planter liner, approx. 1 1/2' x 5'. Call John, x4258 or 488-3128.

### Wanted

Looking for beginners golfclub and bag set for \$50. to \$100. Call Dick, 554-6241.

Want wood dining room set, six chairs, china; girl's white canopy bed and dresser; living room set in Earth tone or green/gold patterns. Call Gary, x2156 or 482-1290.

Lady to live-in and take care of two children, references please. Call 996-9516.

Women soccer players, 18 and over, needed for Bay area club, practice Friendswood on Tues. and Thurs., 8 to 10 p.m., games on Sundays, thru Dec. Call Kitty, 334-6418 or Bonnie, 676-8977.

South Wind Wanderers Club, Girl Scouts of America associated, looking for girls 7th thru 12 grades and interested adults for backpacking. Call M. L. Huber, 488-8050.

The Sagemont Eagle car pool is still looking for 1 person to join 4-person pool, leaves at 7:35 a.m. from Sagemont and returns around 5:30 p.m., loads of fun. Call L. Parker, x4241.

Want persons interested in learning Chinese cooking. Call Mike, x3335 or 480-4286.

Want wrecked 10-speed or gears and chain from same, will pay \$10. Call Lee, x3459 or 488-1146.

Want 4' x 8' big wheel utility trailer in good condition. Call Bob, 488-2801 after 6 p.m.

Want ride from Red Bluff/Thomas area, 7:30 a.m. to 4 p.m. shift. Call Kathleen, x4319.

Want ride from Webster to San Jacinto South for a 6:30 p.m. Wed. class. Call Maria, x4291 or 332-5345.

Two graduate students or professional single females to share large 3 BR home w/same, cable, microwave, W/D, 2 car garage, no children, all bills paid, \$100 deposit, \$400/\$410 per month. Call 486-8859 after 5:30 p.m.

Want electric piano or synthesizer; bicycle rack and fenders for 10-speed. Call Larry, x5435 or 480-7917.

Want roommate to share 3 BR home in Middlebrook. Call Wayne, x2213 or 486-7141.

Want to carpool from Quail Valley/Mo. City area to NASA. Call Bob Patil, 488-9005 or 499-7990 evenings.

### Cars & Trucks

1975 Plymouth Valiant Brougham, V-8, 4 dr., auto, AC, AM/FM/tape, clean, low miles, \$1,495 or best offer. Call 488-0491 after 5 p.m.

1979 Ford 1/2 ton pickup, F150, LWB, 6 cyl., std. shift, 51K miles, light blue with stripes, \$3,295 firm. Call Jim, x5017 or 481-3648.

1976 GMC 1/2 ton heavy duty pickup, PS, PB, cruise, dual tanks, fiberglass camper top, sliding rear window, CB, AC, AM/FM, \$2,600. Call 482-6046 after 5 p.m.

1977 Mercury Cougar, excellent condition, retail N.A.D.A. \$2,895, asking \$2,149. Call Charlie, x3655 or 333-4681.

1974 Gremlin, auto, AC, 52K miles, good engine, recent transmission, brake jobs, \$400. Call Taylor, 481-2575 after 5 p.m.

1973 Ford LTD, average condition, \$1,000. Call 680-0968.

1981 Mazda RX-7, 5 spd. trans., AC, AM/FM/cassette, sunroof, radials, \$9,800. Call 474-3523.

1972 Mustang Mach 1, 351 Cleveland HO, engine, transmission and brakes rebuilt, PS, PB, air shocks, AM/FM/8 track, \$2,750. Call Wood, x4464 or 333-2373.

1976 Chevy Nova, 2 dr., good second car, body in excellent condition. Call Lorna, 482-5305.

1982 Toyota Supra, performance package, like new, must sell. Call mark, x2991 or 480-2538.

1978 Toyota, AC, AM/FM, 4 spd. Call 489-1145 after 6 p.m.

1978 Suburban, AC, cruise, new tires, excellent condition, blue, \$4,600. Call Kandy, x7256 or 482-2750.

1977 Datsun 200 SX, AM/FM/cassette, AC, runs great, original owner, must sell. Call 471-6987 after 6 p.m.

1968 Mustang GT California Special conv., red/black, very rare, turns heads, good condition, \$4,500. Call Tim, x2276 or 488-6167 after 5 p.m.

1969 Chevy Impala, 4 dr., 327, blue, AC, auto, excellent condition, good tires, \$1,000. Call 472-5427.

1979 Monte Carlo, AC, PS, PB, auto, AM/FM/cassette, wire wheels, low miles, excellent condition, one owner, \$5,100. Call 488-0170 after 6 p.m.

1981 Rabbit Diesel L.S., only 8K miles, still under warranty, has everything including cruise, forest metallic green, \$6,495. Call 333-2468.

1979 GMC van housecar, good condition, fully equipped, built-in icebox, sink, water supply, see to appreciate, \$7,500. Call 332-8188 after 5:30 p.m.

1972 Datsun 240Z, Runs very well, needs some front end body work, \$1,800. Call x2313 or 488-1689.

1975 Mustang II hatchback, 4 spd., V-6, AC, AM/M/tape, good condition. Call 488-4971 evenings.

1977 Pinto wagon, good condition, under 47K miles, AC, AM. Call Dave Z., x3048 or 482-0651.

1973 Toyota Celica, yellow, AM/FM/cassette, new tire and rebuilt engine, \$1,100. Call 488-9005 or 641-5649 after 5 p.m.

1965 El Camino pickup, 283 V-8, manual, new paint, good condition, \$1,295. Call 488-7938 after 5 p.m.

1970 Maverick, 2 dr., AC, radio, runs well, \$800. Call Brenda, x5217.

1981 Trans Am, special edition, loaded, best offer. Call 484-5907, or come see at 950 FM 1959, Windjammer Apts. #702.

1974 Dodge Colt 2 dr. sedan, 25 mpg., runs very well, new battery, some rust, \$400. Call D. Lipson, 488-9005 or 486-8890 evenings.

1979 Datsun 210 4 dr. station wagon, super mint condition, low miles, reg. gas. Call 485-6423.

1971 Chrysler Station wagon, original owner, new parts and tires, good condition. Call 333-3712.

Premier snare drum, stand, pad and carrying case for band student, like new, \$100. Call 488-3620.

Skyline violin w/case, wood bow, \$200. Call R.T., x2525.

### Cycles

1977 Suzuki RM 125, DG kit, excellent condition, \$450. Call 488-0170 after 6 p.m.

1981 Honda CB custom, 4,000 miles, extended warranty, case guards, backrest, excellent condition, \$2,000. Call D. J., 425-3594 work, 943-2378 home.

Honda CB350, looks and runs well, \$475. Call Bob A., x2901.

1980 Honda express, like new, 180 miles, \$350. Call Jack, x6421 or 944-2672 after 5 p.m.

1975 Honda CB360T, 5,700 mi., fairing, saddle bags, back rest, rack, more, \$700. Call Hank, x4061 or 488-3178.

1976 Honda XL 175, helmet, excellent condition, low miles, make offer. Call T. Smith, x4468.

Men's 10 speed, good condition, \$40. Call Ralphine, 333-8477 or 333-4813.

10 speed bike, \$50. Call Swilley, 486-0573.

### Boats & Planes

Piper Lance for rent, AC, club seating, \$65/hr. wet. Call L. Damewood, 482-5572.

1978 Cessna 152, \$24.85/hr. wet, G. A. Tiger, \$41.85/hr. wet. \$8/mo. dues, \$50 membership, Gulf Coast Aero. Call Mark, x4436 or 554-2538 after 5 p.m.

1975 Bayliner, 25 feet, full galley, sleeps six, inboard/outboard, good shape, \$9,500 w/trailer. Call 481-1695 evenings.

1973 Ouachita 14 foot jon boat, 20 hp. Chrysler outboard, Dilly trailer, good condition, \$1,050. Call 331-0608 after 6 p.m.

Sunfish sailboat, good condition. Call 485-7624 after 6 p.m.

Stainless steel prop, 15 1/2 x 19 cupped, new in box, fits 470 Mercruiser and others, \$150 firm. Call 554-2969.

### Audio

Heathkit AM/FM stereo tuner, AJ-43, \$50; Heathkit Stereo preamp, AA-11, \$40; Garrard 4HF turntable w/cartridge, \$30. Call Samouce, x4727.

Ham radio — tempo one SSB transceiver, AC/one pwr. supply, mic., headphones, carton and manual. Call 482-5984 after 5 p.m.

Ham radio — Kenwood SSB transceiver, TS-520S, MC-50 mic., HS-4 headphones carton and manual, like new. Call 482-5984 after 5 p.m.

Wards AM/FM stereo with turntable, works and sounds good, \$100. Call Swilley, 486-0573.

### Lost

18" narrow gold chain lost Aug. 23 between parking lot and Bldg. 1. Call Ransdell, x3658 or 488-0219.

Gold band initial ring lost in vicinity of Bldg. 1, initials SAK. If found call Kamen, x4253.

Prescription glasses, bifocal, dark plastic rim, soft black case, lost in parking lot between Bldg. 16 and 30. Call Shannon, x2741.

### Photography

New Pentax ME super, 50mm, 2.0 lens, in box w/warranty card, camera bag included, \$230. Call Wayne, x3464.

Konica EE-matic, rangefinder camera w/case, needs work, \$15. Call Killingsworth, x2313 or 488-1689.

### Musical Instruments

Open hole flute with B-flat key, Call Dennis, x3291 or 1-925-5152.

Bass guitar, fender "precision" with case, cord and stand, \$475; amplifier/speaker for bass, Peavy TNT 100 on hard rubber wheels, \$275. Call Killingsworth, x2313 or 488-1689.

### Pets

Two year old Chow Chow, black, register, all shots. Call 996-0518 after 5:30 p.m.

Beagle, very friendly, 3 years old, needs home. Call 332-7056.

### Miscellaneous

Conn coronet, \$150; redwood patio furniture, needs cushions, \$100; Heathkit room air cleaner, \$50; Revereware copper bottom pot and pan set, \$35; Lady Schick Mist curler set, used once, \$12. Call Donna, x4571 or 479-8562.

Refractor telescope, 2 1/4" with mount, excellent condition, many accessories, camera adaptable, \$75. Call Gary, x2156 or 482-1290.

H78-15 tire and rim, \$25; donut spare tire and rim, \$20. Both 5 lugs. Call 482-7042 after 5 p.m.

Sears tent, sleeps 4 to 6, excellent condition, \$40. Tappan refrigerator/freezer, old but works perfectly, \$150. Call 332-8328 after 5 p.m.

Red go-cart, 2 1/2 hp. engine, new rear tires, engine needs tune, \$165. Call Dick, x6411 or 946-4075 after 5 p.m.

16" Stihl chain saw; mini bike carrier, \$15; roll-around tool box, \$50; three 5-gallon cans of penta wood preservative; 12" Rockwell radial arm saw includes base, \$500. Call Joe, x3565.

Refurbished GM radiator, removed from 1978 Chevy, \$35. Call Hagan, x4643 or 488-0044.

Mint U.S. stamp sheets at 10% above face, good assortment, \$100 minimum purchase. Call Jeff, x7449.

Fish tanks: two 10 gal., one 5 gal., stand, lights, filters, many accessories. Call Tom, x4258 or 480-2776 after 5 p.m.

Suede light green and gray gun case with fur lining, excellent condition, \$20. Call 472-5243 after 5:30 p.m.

Longbed camper shell, cab height, \$145. Call 480-6325 after 5 p.m.

Foosball table, good quality, \$125. Call Plauche, x2783 or 474-2660.

Bay Area Racquet Club membership, family, \$650. Call T. Sherwin, x2531 or 333-2985.

Free: 300 feet of eave edge drip strips. Call Marchal, 534-3021 after 5 p.m.

1975 Apollo-Soyuz commemorative stamps. Call Jeff, x7449.

Sears Kenmore upright vacuum, perfect shape, \$25. Call x6154 or 480-2439 after 5 p.m.

Survey currently underway for women interested in appearing in future JSC calendar, NASA/contractor employees. Call Wayne, x3464 or 482-9013.

Four 15-inch wheels from GMC pickup, make offer. Call Patti, x4841.

Two pair Hooker headers, fits 350 and 455, \$40; one pair Gabriel Striders shocks, \$20; new infrared space heater, \$80; other misc. items. Call 332-0187.

Two tables, two stanchions for vans, cost \$51 each new and never used, will sell for \$40 each table and stanchion. Call W. Der Bing, x4241.

Front and rear seat covers for 67-68 VW, original material, easy installation. Call Huntley, x5858.

Rifle, 30.06 bolt-action 5-shot Remington with 4X Savage scope, sporterized stock w/Monte Carlo cheek piece, leather sling. Call 474-4447 after 6 p.m.

Unused, brand new Arthur Fulmer motorcycle helmet, \$70. Call Raymond, x2759 or 488-3228.

Deluxe water filter system, Culligan "Aqua-clear" reverse osmosis system model H-5, about 4 years old, retails \$700, best offer. Call 280-0860 after 5 p.m.

Johnson Messenger 40 channel CB w/K40 antenna, \$50; Kelsey Hayes electric trailer brake controller, \$